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SOVIET MACHINE BUILDING

NO. 24

SELECTED TRANSLATIONS

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Introduction

This is a serial publication containing selected translations of articles on the machine-building industry in the Soviet Union. This report consists of translations on subjects listed in the table of contents below.

	<u>Table of Contents</u>	<u>Page</u>
1.	Prospective Types of Television Sets.....	1
2.	The Izumrud-203 Television Set.....	5
3.	Epiprojector Console.....	6
4.	Silicon Junction Triodes.....	8
5.	Germanium Junction Triodes.....	10

1. Prospective Types of Television Sets

Following is the translation of an unsigned article entitled "Perspektivnye Tipy Televizorov" (English version above) in *Tekhnika Kino i Televideniya* (Film and Television Engineering), No. 4, Moscow, April 1960, pages 95-96.⁷

In February 1960 there took place a meeting of the television section of the Technical Scientific Society of Radio Engineering and Electrical Communication imeni A. S. Popov, at which the report of A. Ya. Breybart, the representative of the Scientific Research Institute of the GKRE [State Committee on Radio Engineering and Electrical Communication?], A. Ya. Breybart, on prospective types of television sets was heard.

The speaker described the present state of television-receiving engineering. He noted that on the basis of basic quality indices the television sets of the type "Rubin," "Temp-3," and many others are in no way inferior to the best models of Western European television sets.

Our television sets have received a high rating at the most recent international exhibits.

However, the image on the screens of many of our sets has a relatively small number of degrees of brightness, a fact that is the result of inferior picture tubes. In addition, some of our sets do not compare to similar Western European and American models in terms of their outward appearance. Serious attention is now being devoted to overcoming these shortcomings.

Currently, up to 1,000 models of different television sets are being produced abroad. Such a large variety of types of sets is not worthwhile, since the reliability of the performance of the receiving network is thus greatly reduced.

In order to establish uniform requirements for television receivers, standard specifications were formulated in our country, and the production of Type I, II, and III sets will be undertaken in conformity with these specifications. The Type I set will have a picture tube with a screen diagonal of 53 cm as well as all the currently known improvements in circuitry and construction. The Type II sets will be equipped with tubes having a screen with a diagonal of 43 cm and will have relatively high sensitivity. The Type III sets will have a screen with a diagonal of 35 cm as well as

unified assemblies. It is assumed that around 1963 the Type II television sets will be the most widespread sets. Our plan envisages the production of an inexpensive vacuum-tube model with a screen diagonal of 43 cm by 1965.

The speaker discussed two basic stages in the development of television-receiver engineering. The first stage, which will occur in the next three to four years, assumes the production of tube-type sets. A block diagram of these television sets has been definitely established. It is necessary to complete this diagram by the addition of certain components. We must first introduce a number of automatic controls which will make it possible to utilize to the fullest extent the potentialities of our television standards and to create a television image of high quality.

The introduction of the following automatic controls is planned: heterodyne-frequency, contrast, brightness, image-size controls and others.

We plan to perfect our production processes, to switch over to modern methods of assembly, and to introduce printed circuits and dip-soldering on a wide scale. The number of sets produced will increase sharply, and, in connection with this increase, the problem of increasing the reliability of the sets will assume greater importance.

Within the next two to three years, the production of the Class I "Temp-6" and "Rubin-104" will begin. In these models, manual tuning will not be necessary when switching from one channel to another. Moreover, these sets will be equipped with many automatic controls, including image-size control. In these and other sets, tubes with an angle of deflection of the beam of 110° will be utilized. As a result of this modification and of the introduction of printed circuits, the size and weight of the sets will be greatly reduced.

Also slated for production are the television sets "Temp-7" and "Almaz-104." According to schematic data, they are similar to the previously mentioned models, differing only in terms of screen size (53 mm).

Class I and Class II sets with tubes with a 110° deflection of the beam and with 360×480 mm and 270×360 mm screens will also be produced. The Class II and III "Voronezh" sets are being readied for mass production.

The large-scale production of Class III models is planned, including "Zarya II," "Komsomolets," "Mayal," and "Start III" models.

Similarly, the "Belarus'-5" and "Khar'kov" sets will be mass-produced. The "Belarus'-5" consists of a 12-channel television set, a five-band radio receiver, and a universal record player.

In addition, the report devoted much attention to the standardization of separate television-set blocks and assemblies. Line transformers, deflection systems, and television channel blocks have already been standardized. We plan to standardize larger blocks in the future: low- and high-frequency amplifiers, feed blocks, and others.

Through the use of such blocks it will be possible in a very short time to effect a sharp increase in the production of television sets and to raise their quality and reliability of operation.

It is assumed that within two to three years the number of semiconductor instruments included in the set will see a significant increase.

The speaker emphasized the special importance of a complete transition to television sets with semiconductor instruments. This is dictated, first of all, by the consideration of economizing electric power. We know that a vacuum-tube set consumes 130 to 160 watts, while a transistorized set will consume only 12 to 20 watts. In view of the anticipated pool of 60 million receivers, the introduction of transistorized sets will save a tremendous amount of electric power. Moreover, it will become possible to save a very large quantity of the nonferrous metals, steels and other expensive materials and parts which would otherwise be used.

The service life and reliability of the set will be substantially increased.

In the light of the above considerations, it is planned, within the next five years, to provide for the introduction of semiconductor instruments in the standardized blocks used in television sets. The plan for the development of a semiconductor technology provides for a complete transition to transistorized models by 1965.

The large-scale introduction of picture tubes with an angle of deflection of the beam of 110° has already begun. Picture tubes with an angle of deflection of 170° are already being produced. Work is being done on the creation of electroluminescent screens. Such screens may be perfectly flat.

Electroluminescent light amplifiers are being developed, and may be successfully used in television receivers.

In conclusion, the speaker touched upon the question of color television. He noted that the high cost and complexity of color receivers has greatly limited their use in the United States.

The systematic experimental transmission of color programs is being carried out in the Soviet Union. Experimental lots of color receivers are being produced. More research is to be carried out in this field in the direction of

the simplification of the systems.

The speaker threw some light on certain problems in projection television. The "Topaz" set and other sets are now being used successfully in our country. The speaker pointed out the possibility of creating small projection tubes with a screen diameter of 30 mm and projection optics made from plastics. Experimental work is being carried out in that direction.

After discussion of this report at the Department, a decision was taken to ask A. Ya. Breytbart to prepare an article based on the material of the report on the future developments in television receiver engineering, and to have this article published in the journal "Film and Television Engineering."

2. The Izumrud-203 Television Set

/The following is the translation of an unsigned article entitled "Televizor 'Izumrud-203'" (English version above) in Tekhnika Kino i Televizionniya (Film and Television Engineering), No. 4, Moscow, April 1960, page 72. /

The Moscow plant for television equipment has created an "Emerald-203" type color television receiver.

This is a projection-type set with a screen of 350 x 460 mm, capable of receiving black and white or color programs on 12 channels.

It is equipped with special controls for focusing and for color control, a system of switches for automatic control of amplification, automatic frequency control of the heterodyne, automatic stabilization of the image size, and a noise-proof synchronization system.

The optical assembly of the set contains three monochromatic kinescopes (red, blue, and green). The image which these kinescopes create is projected by means of lenses onto a reflecting screen which is mounted inside the receiver's cover.

The sound block of the set contains an ultralinear low-frequency amplifier with a wide-band acoustic system with four dynamic loudspeakers.

The basic components of the circuit are of a block-type construction. Certain blocks have printed circuits. In all, the receiver contains 36 radio tubes, three kinescopes, and 29 semiconductor devices.

The receiver's capacity is 380 watts. Its size is that of an average monochromatic set.

3. Epiprojector Console

Following is the translation of an unsigned article entitled "Pul't Epiproyektora" (English version above) in *Tekhnika Kino; Televideniya* (Film and Television Engineering), No. 4, Moscow, April 1960, page 70.⁷

An epiprojector console consisting of a receiver-transmitter television assembly mounted on a special work table was created at one of the plants engaged in the manufacture of television equipment.

This console may be used as a terminal device in the closed-circuit television networks of industrial plants, for service inside airports, in transportation, and a supplementary device in the mechanical study-aid equipment used by television centers. This console makes it possible to transmit or receive the image of any graphical material.

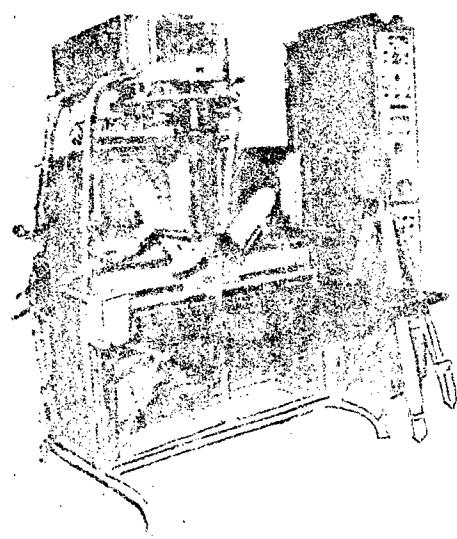
The console may be connected directly to an ultra-short-wave radio network, into the circuit of the mechanical study-aid set-up of the television center, or to the control panel of the program director. In the former case, it may be used in lieu of a monochromatic stand for the transmission of test papers. Here, the test papers may bear the name and emblem of the city.

Simple broadcasts (lectures and reports, accompanied with illustrations) may be broadcast only from the console; in this case, all the study-aid apparatus of the television centers is free for other uses.

The camera uses a scanning beam of reflected light for the transmission of illustrated material. A high-quality image which is free of black spots (the spurious signals), an even degree of light over the entire field of the image, and the absence of the residual signal which is characteristic of the transmitter tubes, are all ensured.

The camera which is used to transmit the image of the speaker is equipped with a transmitter tube with a phototransistor of the "Molot-1" type. Two video-control devices are installed in the console. One of them is intended for the control of the image which is transmitted from the console, and the other for viewing the image which is fed to the ultra-short-wave radio network.

The apparatus for amplification, scanning, and feed are mounted on the stand.



4. Silicon Junction Triodes

Following is the translation of a table entitled "Kremniyevye Splavnye Triody" (English version above) in Avtomatika, Telemekhanika i Svyaz (Automation, Telemechanics, and Communications) No. 5, Moscow, May 1960.7

Types of Triodes	Field of Application	Basic parametric values at temperature $t = +20 \pm 5^\circ C$ in common-base circuit with collector voltage of 5 v and emitter circuit of 1 milliwatt			
		Current gain at $t = +20^\circ C + 120^\circ C$ not less than	Cut-off frequency not less than (kilocycles/sec)	Collector back current not less than (microamperes)	Output conductance not less than (mmho)
1. P101	Signal amplification in the range of frequencies to 200 kc	0.9	200	50	3.3
2. P101A	Signal amplification in the range of frequencies to 200 kc	0.9	200	50	3.3
3. P102	Signal amplification in the range of frequencies to 465 kc	0.93	465	50	2.0
4. P103	Signal amplification in the range of frequencies to 1,000 kc	0.9	1000	50	3.3

Table continued on next page7

Table continued from page 87

Permissible limit values

Power dissipated at collector without additional heat removal (milliwatts)	Collector Voltage in common-base circuit (v)	Collector current (ma)	Emitter Current (ma)
150	+20	20	20
150	+10	20	20
150	+10	20	20
150	+10	20	20

The power which is dissipated at the collector without additional heat removal in the open air at a temperature of the surrounding medium of up to $+75^{\circ}\text{C}$ is 150 milliwatts. The temperature of the case of the triode is from -60°C to $+120^{\circ}\text{C}$. The temperature of the collector junction $+150^{\circ}\text{C}$. Structurally the triode is hermetically sealed inside a metal case; the base lead is electrically connected to the case. The service life of the triode is not less than 5,000 hours.

5. Germanium Junction Triode

Following is the translation of a table entitled "Germaniyevye Splavnye Triody" (English version above) in Avtomatika, Telemekhanika i Svyaz' (Automation, Telemechanics, and Communications) No. 5, Moscow, May 1960.⁷

Types of Triodes	Fields of Application	Basic parametric values at temperature $t = 20^{\circ}\text{C}$ 5°C			
		Current gain ¹ at fre- quency of 1 kc	Current gain at cut-off frequency ¹	Collector back cur- rent ² (micro- ampere)	Emitter back current ² (micro- ampere)
1. P12	Amplification and generation of high-frequency pulses and operation in pulse circuits. ³	0.95	0.7	6	20
2. P406	Same	0.95	0.7	6	20
3. P407	Same	0.95	0.7	6	20

1 In a common base circuit, with emitter current of 1 ma and collector voltage of 6 v.

2 With collector voltage of 6 v.

3 The triodes are intended for operation in pulse circuits and are marked with a red dot on the case.

Table continued on next page⁷

Table continued from page 107

Basic parametric values at temperature $t = 20^{\circ}\text{C}$ 5°C				Permissible limit value			
Output con- duc- tance of base ₁ (mmho)	Ohmic resis- tance (base ₁ (ohms))	Collector Capaci- tance (picofa- rads)	Cutoff fre- quency (cycles)	Power dissi- pated at col- rent gain (mega- cycles)	Collector voltage in cir- cuit with elec- tor out addi- tional heat remov- al (mil- li- watts)	Collector current (ma)	Emitter current (ma)
2	150	20	5	30	-6	5	5
2	150	20	10	30	-6	5	5
2	150	20	20	30	-6	5	5

The triodes are designed for operation within the range of temperatures of the surrounding air from -60° to $+75^{\circ}$. Structurally, they are hermetically sealed inside a metal case. The service life of the triodes is not less than 5,000 hours.

END